

# Supplementary Materials

## Mutations on designated COVID-19 diagnostic test reagents

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## S1 Supplementary Tables

Table S1: Designated COVID-19 diagnostic primers and probes.

Primer/probe	Sequence	Gene site
RX7038-N1 primer (Fw) <sup>a</sup>	GACCCCAAATCAGCGAAAT	28287:28306
RX7038-N1 primer (Rv) <sup>a</sup>	TCTGGTACTGCCAGTTGAATCTG	28335:28358
RX7038-N2 primer (Fw) <sup>a</sup>	TTACAAACATTGGCCGCAA	29164:29183
RX7038-N2 primer (Rv) <sup>a</sup>	GCGCGACATTCCGAAGAA	29213:29230
RX7038-N3 primer (Fw) [1]	5'-GGGAGCCTTGAATACACCAAAA-3'	28681:28702
RX7038-N3 primer (Rv) [1]	5'-TGTAGCACGATTGCAGCATTG-3'	28732:28752
N1-U.S-P [2]	FAM-ACCCCGCATTACGTTT-G-BHQ1	28309:28325
N2-U.S-P [2]	FAM-ACAATTTGCCCCAGCGCTTCAG-BHQ1	29188:29210
N3-U.S-P [2]	FAM-AYCACATTGGCACCCGCAATCCTG-BHQ-1	28704:28727 (Y:T)
N-Sarbeco-F <sup>b</sup> [3]	CACATTGGCACCCGCAATC	28706:28724
N-Sarbeco-P <sup>b</sup> [3]	FAM-ACTTCCTCAAGGAACAACATTGCCA-BBQ	28753:28777
N-Sarbeco-R <sup>b</sup> [3]	GAGGAACGAGAAGAGGCTTG	28814:28833
N-China-F [2]	GGGGAACCTCTCTGCTAGAAT	28881:28902
N-China-R [2]	CAGACATTTTGCTCTCAAGCTG	28958:28979
N-China-P [2]	FAM-TTGCTGCTGCTTGACAGATT-TAMRA	28934:28953
N-HK-F [2]	TAATCAGACAAGGAAGCTGATTA	29145:29166
N-HK-R [2]	CGAAGGTGTGACTTCCATG	29236:29254
N-JP-F [2]	AAATTTTGGGGACCAGGAAC	29125:29144
N-JP-P [2]	FAM-ATGTCGCGCATTGGCATGGA-BHQ	29222:29241
N-TL-F [2]	CGTTTGGTGGACCCTCAGAT	28320:28339
N-TL-R [2]	CCCCACTGCGTTCTCCATT	28358:28376
N-TL-P [2]	FAM-CAACTGGCAGTAACCA-BQH1	28341:28356
E-Sarbeco-F1 <sup>c</sup>	ACAGGTACGTTAATAGTTAATAGCGT	26269:26294
E-Sarbeco-R2 <sup>c</sup>	ATATTGCAGCAGTACGCACACA	26360:26381
E-Sarbeco-P1 <sup>c</sup>	ACACTAGCCATCCTTACTGCGCTTCG [5']Fam [3']BHQ-1	26332:26357
nCoV-IP2-12669Fw <sup>c</sup>	ATGAGCTTAGTCCTGTGG	12690:12707
nCoV-IP2-12759Rv <sup>c</sup>	CTCCCTTTGTTGTGTTGT	12780:12797
nCoV-IP2-12696bProbe(+) <sup>c</sup>	AGATGTCTTGTGCTGCCGGTA [5']Hex [3']BHQ-1	12717:12737
nCoV-IP4-14059Fw <sup>c</sup>	GGTAACTGGTATGATTTTCG	14080:14098
nCoV-IP4-14146Rv <sup>c</sup>	CTGGTCAAGGTTAATATAGG	14167:14186
nCoV-IP4-14084Probe(+) <sup>c</sup>	TCATACAAACCACGCCAGG [5']Fam [3']BHQ-1	14105:14123
RdRP-SARSR-F2 <sup>d</sup>	GTGARATGGTCATGTGTGGCGG	15431:15452 (R:A)
RdRP-SARSR-R1 <sup>d</sup> [3]	CARATGTTAAASACACTATTAGCATA	15505:15530 (R:A, S:A)
RdRP-SARSR-P2 <sup>d</sup> [3]	FAM-CAGGTGGAACCTCATCAGGAGATGC- BBQ	15470:15494
ORF1ab-China-F [2]	CCCTGTGGGTTTTACTACTTAA	13342:13362
ORF1ab-China-R [2]	ACGATTGTGCATCAGCTGA	13442:13460
ORF1ab-China-P [2]	FAM-CCGTCTGCGGTATGTGGAAAGGTTATGG-BHQ1	13377:13404
ORF1b-nsp14-HK-F [2]	TGGGGYTTTACRGGTAACCT	18778:18797 (Y:T, R:A)
ORF1b-nsp14-HK-R [2]	AACRCGCTTAACAAAGCACTC	18889:18909 (R:A)
ORF1b-nsp14-HK-P [2]	FAM-TAGTTGTGATGCWATCATGACTAG-TAMRA	18849:18872 (W:A)

Table S2: New Designated COVID-19 diagnostic primers and probes.

Primer/probe	Sequence	Gene site
SC2-F <sup>e</sup>	CTGCAGATTTGGATGATTTCTCC	29463:29485
SC2-R <sup>e</sup>	CCTTGTGTGGTCTGCATGAGTTTAG	29530:29554
NIID_WH-1_F501 <sup>f</sup> [4]	TTCGGATGCTCGAACTGCACC	484:504
NIID_WH-1_R913 <sup>f</sup> [4]	CTTTACCAGCACGTGCTAGAAGG	874:896
NIID_WH-1_F509 <sup>f</sup> [4]	CTCGAACTGCACCTCATGG	492:510
NIID_WH-1_R854 <sup>f</sup> [4]	CAGAAGTTGTTATCGACATAGC	816:837
NIID_WH-1_Seq_F519 <sup>f</sup> [4]	ACCTCATGGTCATGTTATGG	502:521
NIID_WH-1_Seq_R840 <sup>f</sup> [4]	GACATAGCGAGTGTATGCC	805: 823
WuhanCoV-spk1-f <sup>f</sup> [4]	TTGGCAAATTC AAGACTCACTTT	24354:24377
WuhanCoV-spk1-r <sup>f</sup> [4]	TGTGGTTCATAAAAATTCCTTTGTG	24876:24900
NIID_WH-1_F24381 <sup>f</sup> [4]	TCAAGACTCACTTTCTTCCAC	24364:24384
NIID_WH-1_R24873 <sup>f</sup> [4]	ATTTGAAACAAAGACACCTTCAC	24834:24856
NIID_WH-1_Seq_F24383 <sup>f</sup> [4]	AAGACTCACTTTCTTCCACAG	24366:24386
NIID_WH-1_Seq_R24865 <sup>f</sup> [4]	CAAAGACACCTTCACGAGG	24830:24848

Table S3: Frequencies of single SNP genotypes in the RX7038-N1 primer (Fw)

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28287G>T	G5V	1	0	1	0	0	0	0	54.3
28289C>T	P6S	3	0	0	0	2	0	1	53.3
28288A>G	G5G	1	0	1	0	0	0	0	58.5
28305A>C	N11T	2	0	2	0	0	0	0	57.8
28289C>A	P6T	2	0	0	1	1	0	0	53.9
28302G>C	R10P	3	1	0	0	2	0	0	55.9
28300G>C	Q9H	1	0	0	0	1	0	0	56.1
28290C>T	P6L	9	0	2	0	0	7	0	53.1
28305A>G	N11S	4	0	0	4	0	0	0	57.8
28297T>C	N8N	5	0	1	2	2	0	0	58.6
28293A>G	Q7R	1	0	1	0	0	0	0	58.0
28294A>C	Q7H	13	0	0	0	8	5	0	57.7
28300G>T	Q9H	17	1	3	4	5	1	3	53.5
28291C>T	P6P	6	1	1	0	4	0	0	53.1
28292C>A	Q7K	11	2	2	1	3	1	2	53.9

Table S4: Frequencies of single SNP genotypes in the RX7038-N1 primer (Rv)

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28340T>A	S23T	1	0	0	0	1	0	0	60.5
28347G>T	G25V	1	0	1	0	0	0	0	58.9
28357G>C	Q28H	1	0	0	0	1	0	0	61.5
28355C>G	Q28E	1	0	0	0	1	0	0	61.2
28356A>G	Q28R	1	0	1	0	0	0	0	63.6
28347G>A	G25D	1	0	0	1	0	0	0	58.9
28339T>A	D22E	1	0	0	0	0	1	0	61.2
28346G>T	G25C	3	0	0	0	1	0	2	59.4
28350G>T	S26I	1	0	0	1	0	0	0	59.6
28337G>T	D22Y	3	0	0	1	1	0	1	58.9
28349A>T	S26C	1	0	0	0	0	1	0	61.2
28349A>G	S26G	1	1	0	0	0	0	0	63.6
28337G>A	D22N	1	0	0	0	1	0	0	60.0
28344C>A	T24N	28	0	0	10	0	0	18	59.6
28354C>T	N27N	3	0	0	0	3	0	0	58.9
28338A>G	D22G	61	0	61	0	0	0	0	63.5
28344C>T	T24I	4	0	3	1	0	0	0	59.6

Table S5: Frequencies of single SNP genotypes in the RX7038-N2 primer (Fw)

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
29177C>T	P302S	1	0	0	0	1	0	0	53.0
29179G>A	P302P	1	0	0	1	0	0	0	52.9
29173T>C	H300H	1	0	1	0	0	0	0	57.3
29183A>G	I304V	2	0	0	0	2	0	0	56.0
29179G>T	P302P	33	3	1	21	7	0	1	52.5
29171C>T	H300Y	21	0	8	2	10	1	0	52.5
29173T>G	H300Q	1	0	0	0	1	0	0	57.3

Table S6: Frequencies of single SNP genotypes in the RX7038-N2 primer (Rv)

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
29230C>T	R319R	1	0	1	0	0	0	0	56.8
29215C>T	F314F	1	1	0	0	0	0	0	56.8
29229G>A	R319H	4	0	0	0	3	0	1	55.5
29227G>T	S318S	14	0	1	1	7	2	3	55.0
29227G>A	S318S	6	0	1	0	2	0	3	55.5
29218C>T	F315F	24	1	14	5	3	1	0	56.0

Table S7: Frequencies of single SNP genotypes in the RX7038-N3 primer (Fw)

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28693T>G	N140K	1	0	0	0	1	0	0	62.9
28696A>T	T141T	1	0	1	0	0	0	0	60.0
28690G>A	L139L	3	0	0	0	0	0	3	58.0
28697C>T	P142S	4	1	2	0	0	1	0	57.9
28688T>G	L139V	1	1	0	0	0	0	0	62.7
28692A>C	N140T	9	0	1	0	2	4	2	62.2
28681G>A	E136E	1	0	0	0	0	0	1	58.9
28685G>T	A138S	4	0	0	4	0	0	0	58.1
28693T>C	N140N	5	0	1	0	4	0	0	63.2
28687C>T	A138A	10	0	2	8	0	0	0	58.4
28688T>C	L139L	222	0	217	0	4	1	0	62.4
28695C>T	T141I	6	2	0	0	4	0	0	57.4
28690G>T	L139F	20	0	0	1	11	8	0	58.0

Table S8: Frequencies of single SNP genotypes in the RX7038-N3 primer (Rv)

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28743T>C	I157T	1	0	1	0	0	0	0	62.2
28752A>C	Q160P	1	0	1	0	0	0	0	60.8
28733A>T	N154Y	2	1	0	0	1	0	0	58.6
28741A>T	A156A	1	1	0	0	0	0	0	58.6
28750A>G	L159L	1	0	0	0	0	0	1	62.5
28738T>G	A155A	1	0	0	1	0	0	0	62.3
28737C>T	A155V	13	2	0	0	11	0	0	58.0
28739G>T	A156S	24	0	1	3	13	6	1	57.6
28741A>G	A156A	1	0	1	0	0	0	0	61.6
28747G>T	V158V	8	0	2	0	6	0	0	57.6
28748C>T	L159L	4	0	1	2	1	0	0	58.0
28744C>T	I157I	13	0	3	1	7	0	2	57.8

Table S9: Frequencies of single SNP genotypes in the N1-U.S-P

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28314G>A	R14H	1	1	0	0	0	0	0	52.2
28310C>A	P13T	3	0	2	0	1	0	0	53.0
28311C>G	P13R	4	0	4	0	0	0	0	55.6
28318T>C	I15I	2	0	0	2	0	0	0	58.3
28325G>T	G18C	16	0	0	1	7	8	0	54.3
28321G>A	T16T	5	0	3	0	1	0	1	52.2
28313C>G	R14G	1	0	0	0	0	1	0	55.3
28315C>T	R14R	2	0	2	0	0	0	0	51.7
28320C>T	T16M	7	0	0	6	1	0	0	52.2
28321G>T	T16T	10	1	0	1	8	0	0	52.4
28310C>T	P13S	12	2	0	0	6	3	1	52.3
28313C>T	R14C	3	0	1	2	0	0	0	52.0
28312C>T	P13P	10	0	4	2	3	0	1	52.2
28314G>T	R14L	3	0	0	1	2	0	0	51.7
28311C>T	P13L	777	0	766	5	2	3	1	52.2

Table S10: Frequencies of single SNP genotypes in the N2-U.S-P

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
29206T>C	A311A	1	1	0	0	0	0	0	68.8
29203C>T	S310S	7	7	0	0	0	0	0	64.7
29199C>T	P309L	2	0	1	0	1	0	0	64.3
29194T>C	F307F	3	0	0	0	3	0	0	68.6
29202G>T	S310I	2	1	0	0	1	0	0	64.8
29201A>T	S310C	1	0	0	0	1	0	0	66.8
29202G>A	S310N	2	0	0	2	0	0	0	65.1
29197C>T	A308A	3	0	0	1	0	2	0	64.3
29195G>T	A308S	6	1	1	0	4	0	0	64.8
29205C>T	A311V	2	0	0	0	2	0	0	65.1
29188A>T	A305A	41	0	38	1	0	2	0	66.9

Table S11: Frequencies of single SNP genotypes in the N3-U.S-P

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28716C>T	T148I	1	0	1	0	0	0	0	64.0
28709A>T	I146F	2	0	2	0	0	0	0	66.4
28705T>G	D144E	1	0	1	0	0	0	0	68.2
28723T>C	N150N	2	0	0	1	0	1	0	68.5
28708C>G	H145Q	4	0	0	3	0	0	1	66.0
28705T>C	D144D	3	0	3	0	0	0	0	68.5
28717C>T	T148T	2	0	1	0	1	0	0	63.8
28706C>A	H145N	1	0	0	0	1	0	0	64.0
28724C>T	P151S	3	0	0	2	0	1	0	64.4
28714C>T	G147G	2	0	0	0	1	0	1	63.7
28720C>T	R149R	11	0	0	3	5	1	2	63.7
28706C>T	H145Y	5	1	2	0	0	2	0	64.0
28727G>T	A152S	13	0	2	3	6	0	2	65.4
28712G>A	G147S	3	1	1	0	1	0	0	63.5
28725C>T	P151L	4	1	1	2	0	0	0	64.4
28708C>T	H145H	27	2	13	1	6	5	0	63.7

Table S12: Frequencies of single SNP genotypes in the N-Sarbeco-F

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28716C>T	T148I	1	0	1	0	0	0	0	56.6
28709A>T	I146F	2	0	2	0	0	0	0	59.5
28723T>C	N150N	2	0	0	1	0	1	0	62.1
28708C>G	H145Q	4	0	0	3	0	0	1	59.0
28717C>T	T148T	2	0	1	0	1	0	0	56.4
28706C>A	H145N	1	0	0	0	1	0	0	58.4
28724C>T	P151S	3	0	0	2	0	1	0	58.5
28714C>T	G147G	2	0	0	0	1	0	1	56.1
28720C>T	R149R	11	0	0	3	5	1	2	56.1
28706C>T	H145Y	5	1	2	0	0	2	0	57.6
28712G>A	G147S	3	1	1	0	1	0	0	55.9
28708C>T	H145H	27	2	13	1	6	5	0	56.1

Table S13: Frequencies of single SNP genotypes in the N-Sarbeco-P

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28776C>A	P168Q	1	0	0	0	1	0	0	61.5
28761A>G	Q163R	1	0	1	0	0	0	0	65.0
28757C>T	P162S	2	0	0	0	0	0	2	61.5
28768A>T	T165T	1	0	0	0	1	0	0	62.4
28754C>T	L161F	9	0	0	3	0	0	6	61.7
28758C>A	P162H	1	0	0	0	0	0	1	61.5
28774G>T	L167F	2	0	0	2	0	0	0	61.4
28770C>T	T166I	5	0	1	0	4	0	0	60.8
28759T>C	P162P	23	0	1	22	0	0	0	65.7
28765A>G	G164G	30	0	0	1	15	14	0	65.1
28775C>T	P168S	26	1	1	2	21	1	0	61.2
28758C>T	P162L	15	0	15	0	0	0	0	61.5

Table S14: Frequencies of single SNP genotypes in the N-Sarbeco-R

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28818C>T	A182V	1	0	0	0	1	0	0	55.1
28817G>A	A182T	1	0	0	0	1	0	0	55.9
28820T>A	S183T	1	0	0	0	1	0	0	58.2
28823T>C	S184P	1	1	0	0	0	0	0	60.0
28819C>T	A182A	1	1	0	0	0	0	0	55.7
28829T>C	S186P	2	0	2	0	0	0	0	60.0
28831C>T	S186S	1	0	0	0	1	0	0	55.7
28819C>A	A182A	1	0	1	0	0	0	0	55.5
28830C>T	S186F	5	0	5	0	0	0	0	55.7
28827G>A	R185H	2	0	1	0	0	1	0	55.1
28817G>T	A182S	16	0	0	2	14	0	0	55.3
28827G>T	R185L	9	3	0	0	6	0	0	55.2
28827G>C	R185P	1	0	0	0	0	0	1	57.4
28833C>T	S187L	17	3	4	0	8	1	1	56.9
28828T>C	R185R	1	0	0	1	0	0	0	59.8
28821C>A	S183Y	69	27	0	0	42	0	0	55.0
28826C>T	R185C	27	2	13	1	6	3	2	55.6

Table S15: Frequencies of single SNP genotypes in the N-China-F

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28885A>G	G204G	1	0	1	0	0	0	0	63.1
28902T>C	M210T	2	0	0	0	0	2	0	62.3
28888T>A	T205T	1	0	1	0	0	0	0	60.8
28889T>C	S206P	1	0	0	0	1	0	0	63.1
28894T>C	P207P	1	0	0	0	0	0	1	63.6
28890C>G	S206C	1	0	1	0	0	0	0	61.3
28893C>T	P207L	15	0	0	0	15	0	0	58.9
28899G>C	R209T	28	17	1	1	9	0	0	61.3
28895G>T	A208S	1	0	0	0	0	0	1	58.7
28900A>C	R209S	1	0	0	0	1	0	0	63.1
28899G>A	R209K	7	4	2	0	1	0	0	59.6
28888T>C	T205T	4	0	0	3	0	0	1	63.1
28892C>T	P207S	5	2	0	2	1	0	0	58.9
28883G>A	G204R	3	0	0	1	2	0	0	58.2
28884G>C	G204A	1	0	0	1	0	0	0	61.1
28896C>G	A208G	52	0	51	1	0	0	0	61.2
28881G>T	R203M	13	3	1	0	6	3	0	59.8
28882G>T	R203S	12	7	1	0	2	2	0	58.6
28887C>T	T205I	95	5	54	7	11	8	10	59.1
28890C>T	S206F	45	0	0	44	1	0	0	59.6
28881G>A	R203K	8672	0	41	3604	35	1	4991	59.4
28882G>A	R203R	8660	0	36	3605	27	0	4992	58.2
28883G>C	G204R	8659	0	36	3604	27	1	4991	61.0

Table S16: Frequencies of single SNP genotypes in the N-China-R

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28976T>C	S235P	1	0	1	0	0	0	0	60.9
28975G>A	M234I	1	0	0	0	0	0	1	55.6
28969C>A	S232R	1	1	0	0	0	0	0	56.4
28978T>A	S235S	2	0	0	0	0	0	2	58.5
28968G>C	S232T	2	0	0	0	0	2	0	58.7
28975G>C	M234I	1	0	0	0	0	1	0	58.1
28966G>A	E231E	2	0	2	0	0	0	0	57.3
28969C>T	S232S	5	0	0	0	3	2	0	55.6
28973A>T	M234L	2	0	2	0	0	0	0	58.5
28979G>T	G236C	3	0	1	2	0	0	0	57.7
28961C>T	L230F	5	0	2	2	1	0	0	56.8
28968G>T	S232I	10	1	0	1	7	1	0	56.3
28975G>T	M234I	23	2	6	0	10	2	3	56.9
28960G>T	Q229H	19	0	1	8	1	0	9	56.3
28979G>A	G236S	2	0	0	2	0	0	0	57.0
28977C>T	S235F	136	1	0	0	135	0	0	57.3
28963T>G	L230L	2	0	0	2	0	0	0	60.5



Table S17: Frequencies of single SNP genotypes in the N-China-P

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28937C>T	L222L	1	0	0	1	0	0	0	54.1
28952T>C	L227L	1	1	0	0	0	0	0	57.8
28940C>T	L223L	4	0	0	4	0	0	0	54.1
28948C>T	D225D	11	0	3	1	6	1	0	52.8
28946G>T	D225Y	1	0	1	0	0	0	0	53.4
28936G>A	L221L	1	0	0	0	1	0	0	52.8
28951A>G	R226R	1	0	0	0	1	0	0	58.5

Table S18: Frequencies of single SNP genotypes in the N-HK-F

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
29160C>T	T296I	2	0	0	1	1	0	0	51.4
29147A>G	I292V	1	0	0	0	1	0	0	55.0
29149C>T	I292I	6	1	2	1	1	0	1	50.8
29148T>C	I292T	138	0	0	72	2	1	63	55.7
29153C>A	Q294K	2	0	0	0	2	0	0	51.6

Table S19: Frequencies of single SNP genotypes in the N-HK-R

SNP position	Protein mutation	Total frequency	Cluster I	Cluster II	Cluster III	Cluster IV	Cluster V	Tm(°C)	
29244T>C	V324A	1	0	0	0	1	0	58.7	
29242A>G	E323E	2	0	0	2	0	0	58.2	
29236C>T	G321G	2	0	0	0	2	0	54.0	
29249C>T	P326S	3	0	0	2	1	0	53.0	
29250C>T	P326L	5	0	2	1	2	0	53.7	
29253C>T	S327L	17	5	1	2	8	0	53.6	
29243G>T	V324F	1	0	0	1	0	0	53.8	
29236C>A	G321G	2	0	0	0	2	0	54.9	
29240G>A	E323K	1	0	1	0	0	0	53.7	
29243G>A	V324I	6	0	0	0	3	3	53.8	
29245C>T	V324V	1	1	0	0	0	0	53.1	
29247C>T	T325I	10	5	0	0	5	0	52.5	
29254G>T	S327S	27	3	5	5	9	1	4	54.0
29254G>A	S327S	6	0	3	1	2	0	0	54.5

Table S20: Frequencies of single SNP genotypes in the N-JP-F

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
29140G>C	Q289H	1	0	1	0	0	0	0	56.7
29143A>C	E290D	3	0	0	0	1	2	0	58.5
29139A>T	Q289L	1	0	0	0	1	0	0	56.2
29138C>A	Q289K	1	0	0	1	0	0	0	54.1
29134G>A	G287G	3	0	1	0	2	0	0	53.4
29139A>G	Q289R	1	1	0	0	0	0	0	59.1
29125A>G	G284G	1	0	0	0	1	0	0	57.2
29128T>C	N285N	2	2	0	0	0	0	0	58.2
29140G>T	Q289H	11	2	6	0	2	1	0	54.0
29144C>T	L291L	42	0	2	8	9	23	0	54.8

Table S21: Frequencies of single SNP genotypes in the N-JP-P

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
29230C>T	R319R	1	0	1	0	0	0	0	58.2
29234G>C	G321R	1	0	0	0	0	1	0	61.1
29231A>G	I320V	1	0	1	0	0	0	0	63.6
29236C>T	G321G	2	0	0	0	2	0	0	58.2
29229G>A	R319H	4	0	0	0	3	0	1	58.7
29236C>A	G321G	2	0	0	0	2	0	0	59.0
29240G>A	E323K	1	0	1	0	0	0	0	59.1
29227G>T	S318S	14	0	1	1	7	2	3	58.4
29227G>A	S318S	6	0	1	0	2	0	3	58.7

Table S22: Frequencies of single SNP genotypes in the N-TL-F

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28328G>C	G19R	1	0	1	0	0	0	0	59.6
28330A>G	G19G	1	0	1	0	0	0	0	62.4
28339T>A	D22E	1	0	0	0	0	1	0	60.2
28331C>T	P20S	8	0	4	3	0	0	1	56.9
28337G>T	D22Y	3	0	0	1	1	0	1	56.8
28337G>A	D22N	1	0	0	0	1	0	0	58.2
28325G>T	G18C	16	0	0	1	7	8	0	57.4
28321G>A	T16T	5	0	3	0	1	0	1	56.9
28326G>C	G18A	1	0	1	0	0	0	0	59.4
28329G>T	G19V	4	0	0	0	1	3	0	56.6
28332C>T	P20L	10	0	1	0	8	1	0	56.7
28328G>A	G19R	3	0	1	0	2	0	0	56.2
28329G>A	G19E	4	0	0	1	0	0	3	57.4
28320C>T	T16M	7	0	0	6	1	0	0	58.4
28321G>T	T16T	10	1	0	1	8	0	0	57.0
28338A>G	D22G	61	0	61	0	0	0	0	62.4
28326G>T	G18V	13	0	11	1	1	0	0	57.4

Table S23: Frequencies of single SNP genotypes in the N-TL-R

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28376G>A	A35T	1	0	1	0	0	0	0	58.6
28371G>A	S33N	1	0	1	0	0	0	0	57.9
28363A>G	G30G	1	0	0	1	0	0	0	63.1
28370A>G	S33G	1	0	0	0	1	0	0	63.0
28361G>C	G30R	2	0	0	0	2	0	0	59.9
28376G>T	A35S	30	3	0	0	27	0	0	58.6
28362G>C	G30A	1	0	1	0	0	0	0	60.1
28359A>G	N29S	2	1	0	0	1	0	0	62.1
28368G>T	R32L	1	0	1	0	0	0	0	56.7
28360T>A	N29K	1	0	0	1	0	0	0	60.1
28367C>T	R32C	2	0	0	0	2	0	0	57.1
28364G>C	E31Q	1	0	0	0	1	0	0	60.4
28368G>A	R32H	24	17	0	0	6	1	0	57.1
28372T>C	S33S	1	0	0	0	1	0	0	62.6
28363A>C	G30G	1	0	1	0	0	0	0	63.0
28373G>T	G34W	13	1	2	2	4	2	2	57.7
28371G>T	S33I	32	7	0	3	21	0	1	57.9

Table S24: Frequencies of single SNP genotypes in the N-TL-P

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
28347G>T	G25V	1	0	1	0	0	0	0	47.7
28355C>G	Q28E	1	0	0	0	1	0	0	51.2
28356A>G	Q28R	1	0	1	0	0	0	0	52.6
28347G>A	G25D	1	0	0	1	0	0	0	47.7
28346G>T	G25C	3	0	0	0	1	0	2	48.5
28350G>T	S26I	1	0	0	1	0	0	0	48.7
28349A>T	S26C	1	0	0	0	0	1	0	51.0
28349A>G	S26G	1	1	0	0	0	0	0	54.6
28344C>A	T24N	28	0	0	10	0	0	18	48.7
28354C>T	N27N	3	0	0	0	3	0	0	47.7
28344C>T	T24I	4	0	3	1	0	0	0	48.7

Table S25: Frequencies of single SNP genotypes in the E-Sarbeco-F1

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
26294T>C	V17A	1	0	0	0	0	0	1	58.1
26286T>C	V14V	2	0	0	0	1	0	1	59.0
26291G>A	S16N	1	0	0	1	0	0	0	55.6
26270C>T	T9I	17	0	0	9	6	2	0	54.6
26272G>T	G10C	2	0	0	0	2	0	0	55.4

Table S26: Frequencies of single SNP genotypes in the E-Sarbeco-R2

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
26372G>T	C43F	2	0	0	1	0	1	0	58.0
26370C>T	Y42Y	6	0	4	1	1	0	0	58.3
26365G>T	A41S	6	0	1	0	0	5	0	58.0
26366C>T	A41V	4	0	1	3	0	0	0	57.7

Table S27: Frequencies of single SNP genotypes in the E-Sarbeco-P1

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
26353C>T	L37F	2	0	2	0	0	0	0	64.5
26332A>G	T30A	1	0	0	1	0	0	0	67.0
26340C>T	A32A	26	0	23	0	0	3	0	63.4
26351C>T	A36V	3	0	1	0	2	0	0	64.0
26352G>T	A36A	1	0	0	0	1	0	0	63.8
26353C>A	L37I	1	0	0	0	1	0	0	64.1
26354T>C	L37P	1	0	0	0	1	0	0	67.7
26356C>G	R38G	1	0	0	0	1	0	0	66.1
26333C>T	T30I	12	1	3	5	3	0	0	63.6

Table S28: Frequencies of single SNP genotypes in the nCoV-IP2-12669Fw

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
12691T>C	N2N	1	0	0	0	0	0	1	53.4
12694G>A	E3E	1	0	0	1	0	0	0	48.2
12695C>T	L4F	2	0	1	0	1	0	0	48.2

Table S29: Frequencies of single SNP genotypes in the nCoV-IP2-12759Rv

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
12795G>A	G37E	1	0	0	0	1	0	0	50.4
12797G>A	G38S	3	0	3	0	0	0	0	52.2
12787A>G	T34T	4	0	4	0	0	0	0	55.0
12793G>A	K36K	1	0	1	0	0	0	0	50.4
12790A>G	T35T	22	0	0	0	5	17	0	55.0
12796A>C	G37G	6	0	6	0	0	0	0	56.1
12788A>G	T35A	1	0	0	0	1	0	0	54.8
12784C>T	N33N	1	0	0	0	0	1	0	49.1
12793G>T	K36N	5	1	1	0	2	1	0	50.3
12792A>G	K36R	2	0	0	2	0	0	0	55.0
12781C>T	Y32Y	37	13	12	3	8	1	0	49.1

Table S30: Frequencies of single SNP genotypes in the nCoV-IP2-12696bProbe(+)

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
12722T>C	S13P	4	1	0	0	1	2	0	65.0
12730T>G	A15A	1	1	0	0	0	0	0	65.1
12719A>G	M12V	1	0	0	1	0	0	0	65.0
12729C>T	A15V	4	0	1	0	3	0	0	60.7
12724T>G	S13S	1	0	1	0	0	0	0	64.8
12733C>T	A16A	2	0	0	0	2	0	0	59.8
12718G>A	Q11Q	2	0	0	0	0	2	0	61.1
12731G>A	A16T	2	0	2	0	0	0	0	59.5

Table S31: Frequencies of single SNP genotypes in the nCoV-IP4-14059Fw

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
14083A>G	N215D	1	0	0	1	0	0	0	52.9
14091T>C	Y217Y	1	0	0	1	0	0	0	53.0
14097C>T	F219F	7	0	0	5	2	0	0	47.8

Table S32: Frequencies of single SNP genotypes in the nCoV-IP4-14146Rv

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
14177C>T	T246I	1	1	0	0	0	0	0	46.0
14172A>G	I244M	1	0	1	0	0	0	0	52.2
14186G>A	R249K	1	0	0	0	1	0	0	48.4
14186G>T	R249M	1	0	0	0	1	0	0	47.7
14185A>G	R249G	1	0	0	0	1	0	0	51.9
14185A>T	R249W	3	0	3	0	0	0	0	48.8
14175A>G	L245L	1	0	0	0	0	0	1	51.6
14183C>T	T248I	9	4	2	0	2	0	1	46.0
14179T>A	L247M	1	0	0	1	0	0	0	48.7
14184C>A	T248T	3	0	0	3	0	0	0	46.7
14178C>T	T246T	16	2	1	5	4	1	3	46.7

Table S33: Frequencies of single SNP genotypes in the nCoV-IP4-14084Probe(+)

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
14109A>G	I223M	1	0	1	0	0	0	0	60.5
14121A>G	P227P	1	0	0	0	1	0	0	60.2
14118G>T	T226T	1	1	0	0	0	0	0	53.9
14122G>T	G228C	7	0	4	0	2	1	0	54.9
14117C>T	T226M	2	2	0	0	0	0	0	54.4
14114C>T	T225I	1	0	0	0	1	0	0	54.5
14119C>T	P227S	3	0	1	1	0	1	0	54.5
14122G>A	G228S	1	0	0	0	1	0	0	55.1
14120C>T	P227L	25	0	0	5	13	3	4	53.8
14117C>A	T226K	1	0	1	0	0	0	0	54.6
14118G>A	T226T	6	0	5	0	1	0	0	54.4

Table S34: Frequencies of single SNP genotypes in the RdRP-SARSr-F2

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
15448G>A	G670S	1	1	0	0	0	0	0	60.8
15450C>T	G670G	3	0	0	0	3	0	0	61.5
15444G>T	M668I	14	0	1	3	8	2	0	62.1
15451G>A	G671S	9	0	0	1	4	4	0	61.2
15438G>T	M666I	62	1	0	1	22	38	0	61.8

Table S35: Frequencies of single SNP genotypes in the RdRP-SARSr-R1

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
15523A>G	N695D	1	1	0	0	0	0	0	54.1
15517G>A	V693I	1	0	0	0	1	0	0	49.7
15519T>C	V693V	2	1	0	0	1	0	0	53.1

Table S36: Frequencies of single SNP genotypes in the RdRP-SARSr-P2

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
15491A>G	D684G	1	0	1	0	0	0	0	68.3
15480C>T	T680T	5	0	3	0	2	0	0	64.2
15477A>G	G679G	3	0	2	1	0	0	0	68.0
15474T>C	G678G	1	0	0	1	0	0	0	68.1

Table S37: ORF1ab-China-F

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
13358C>T	L112F	1	0	0	0	0	1	0	55.8
13345T>C	P107P	1	0	1	0	0	0	0	60.4
13356C>T	T111I	10	0	1	2	2	3	2	54.5
13348G>T	V108V	7	0	2	0	4	1	0	55.6

Table S38: Frequencies of single SNP genotypes in the ORF1ab-China-R

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	Tm(°C)
/	/	/	/	/	/	/	/	/

Table S39: Frequencies of single SNP genotypes in the ORF1ab-China-P

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
13401A>T	Y126F	1	0	1	0	0	0	0	68.1
13385G>A	G121S	1	0	0	1	0	0	0	65.3
13381C>G	V119V	1	0	0	0	0	1	0	67.5
13378C>T	T118T	7	0	1	1	0	0	5	65.3
13402T>C	Y126Y	1	1	0	0	0	0	0	69.1
13387T>C	G121G	4	0	0	1	3	0	0	69.5
13389T>C	M122T	2	0	0	2	0	0	0	69.1
13381C>T	V119V	26	0	0	23	2	0	1	66.2
13379G>A	V119I	4	0	2	0	2	0	0	65.5
13401A>G	Y126C	1	0	0	0	1	0	0	69.5
13397G>A	G125S	3	0	0	0	1	2	0	65.7
13384C>T	C120C	8	0	2	1	1	0	4	65.5
13403G>A	G127S	1	0	0	0	1	0	0	64.9
13381C>A	V119V	1	0	0	1	0	0	0	65.3

Table S40: Frequencies of single SNP genotypes in the ORF1b-nsp14-HK-F

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
18794A>T	N252I	1	0	0	0	1	0	0	55.1
18795C>T	N252N	1	1	0	0	0	0	0	52.9
18796C>T	L253L	2	0	1	0	1	0	0	53.5
18780G>T	W247C	3	1	0	2	0	0	0	53.2
18792T>C	G251G	3	0	0	3	0	0	0	58.9
18782G>T	G248V	2	0	0	1	1	0	0	53.5

Table S41: Frequencies of single SNP genotypes in the ORF1b-nsp14-HK-R

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
18909T>C	V290V	1	0	1	0	0	0	0	58.9
18890A>G	E284G	1	0	0	0	0	1	0	60.7
18906T>C	R289R	1	0	0	0	0	0	1	60.4
18902A>C	K288T	1	0	0	1	0	0	0	60.4
18891G>A	E284E	4	0	4	0	0	0	0	56.4
18907G>T	V290F	17	0	4	11	1	0	1	56.5
18905G>A	R289H	1	1	0	0	0	0	0	55.6
18898G>T	V287F	46	2	0	40	1	0	3	56.5
18904C>T	R289C	17	0	0	0	12	5	0	55.6

Table S42: Frequencies of single SNP genotypes in the ORF1b-nsp14-HK-P

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
18858T>C	D273D	3	0	0	0	3	0	0	58.6
18861A>T	A274A	2	0	0	2	0	0	0	55.2
18863T>C	I275T	6	1	1	0	4	0	0	58.6
18867G>T	M276I	1	0	0	0	1	0	0	54.1
18864C>T	I275I	1	0	0	0	0	0	1	54.1
18859G>T	A274S	24	1	0	7	5	0	11	54.3

Table S43: Frequencies of single SNP genotypes in the SC2-F

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
29482C>T	F403F	1	0	1	0	0	0	0	57.5
29463C>T	A397V	2	0	1	0	0	1	0	58.2
29470T>A	D399E	1	0	0	0	1	0	0	58.7
29464T>A	A397A	1	0	0	0	1	0	0	58.7
29467A>T	A398A	4	0	2	1	0	0	1	58.7
29468G>T	D399Y	4	0	1	0	1	1	1	56.2
29467A>C	A398A	1	0	0	1	0	0	0	61.2
29464T>C	A397A	4	0	0	2	0	0	2	61.2
29468G>A	D399N	2	0	0	0	2	0	0	57.5
29468G>C	D399H	1	0	0	1	0	0	0	59.0
29474G>T	D401Y	67	0	0	29	24	11	3	56.1

Table S44: Frequencies of single SNP genotypes in the SC2-R

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
/	/	/	/	/	/	/	/	/	/

Table S45: Frequencies of single SNP genotypes in the NIIDWH-1F501

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
503C>T	P80S	2	0	0	0	1	0	1	62.2
488G>A	D75N	1	0	1	0	0	0	0	62.6
491G>A	A76T	5	0	5	0	0	0	0	61.8
490T>C	D75D	3	0	3	0	0	0	0	66.9
492C>T	A76V	1	0	1	0	0	0	0	62.9
498C>T	T78I	2	0	0	0	1	0	1	62.8
497A>G	T78A	1	0	1	0	0	0	0	66.5
501C>T	A79V	2	0	0	1	1	0	0	61.8
504C>T	P80L	2	0	0	1	0	1	0	63.1
486C>T	S74L	2	0	0	1	0	0	1	62.7
487G>A	S74S	18	0	2	0	15	0	1	62.0
490T>A	D75E	192	0	192	0	0	0	0	64.7
489A>G	D75G	24	0	0	22	0	2	0	67.1

Table S46: Frequencies of single SNP genotypes in the NIIDWH-1R913

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
878C>A	L25I	1	0	1	0	0	0	0	59.5
874C>A	D23E	1	0	0	0	1	0	0	60.8
875C>T	L24F	4	0	1	2	0	1	0	60.0
885G>T	R27L	4	0	0	3	0	0	1	59.7
888C>T	A28V	1	0	0	0	0	0	1	60.2
883A>C	A26A	1	0	0	0	1	0	0	64.2
882C>T	A26V	2	0	0	0	1	1	0	59.2
884C>A	R27S	1	0	1	0	0	0	0	59.7
886T>C	R27R	1	0	0	1	0	0	0	64.1
881G>A	A26T	4	0	0	0	4	0	0	60.2
874C>T	D23D	8	0	0	0	8	0	0	60.8
889T>C	A28A	2	0	0	1	1	0	0	64.3
884C>T	R27C	68	1	61	2	2	2	0	59.6
895A>G	K30K	30	0	30	0	0	0	0	63.8

Table S47: Frequencies of single SNP genotypes in the NIIDWH-1F509

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
503C>T	P80S	2	0	0	0	1	0	1	55.1
510G>A	G82D	1	0	0	0	1	0	0	56.6
492C>T	A76V	1	0	1	0	0	0	0	57.4
498C>T	T78I	2	0	0	0	1	0	1	55.9
497A>G	T78A	1	0	1	0	0	0	0	60.0
501C>T	A79V	2	0	0	1	1	0	0	54.5
509G>A	G82S	10	7	0	0	2	1	0	54.3
504C>T	P80L	2	0	0	1	0	1	0	55.7
505T>C	P80P	2	0	0	2	0	0	0	61.1
506C>T	H81Y	7	0	3	3	0	1	0	55.1

Table S48: Frequencies of single SNP genotypes in the NIIDWH-1R854

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
818T>C	Y5H	1	0	0	0	0	1	0	58.5
817C>T	R4R	1	0	0	0	1	0	0	53.8
816G>A	R4H	2	0	1	0	0	0	1	54.2
837G>T	C11F	1	0	0	1	0	0	0	54.6
835C>T	F10F	24	1	6	6	9	2	0	54.3
823C>T	V6V	36	1	4	13	2	1	15	53.5
829C>T	N8N	46	7	6	6	26	0	1	52.6
832C>T	N9N	19	0	6	7	4	1	1	53.8
833T>C	F10L	131	54	2	0	75	0	0	57.4



Table S49: Frequencies of single SNP genotypes in the NIIDWH-1SeqF519

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
518A>G	M85V	1	0	0	0	1	0	0	57.0
503C>T	P80S	2	0	0	0	1	0	1	50.9
510G>A	G82D	1	0	0	0	1	0	0	50.9
512C>T	H83Y	4	1	2	0	1	0	0	51.0
511T>C	G82G	1	0	0	1	0	0	0	56.5
514T>G	H83Q	1	0	0	1	0	0	0	56.0
515G>C	V84L	1	0	0	1	0	0	0	53.2
516T>G	V84G	1	0	0	1	0	0	0	55.9
517T>C	V84V	1	0	0	1	0	0	0	56.4
519T>C	M85T	1	0	0	1	0	0	0	56.5
520G>A	M85I	1	0	0	1	0	0	0	50.2
521G>T	V86F	2	0	1	0	0	0	1	52.4
509G>A	G82S	10	7	0	0	2	1	0	50.2
520G>T	M85I	5	0	0	1	4	0	0	51.5
504C>T	P80L	2	0	0	1	0	1	0	51.5
505T>C	P80P	2	0	0	2	0	0	0	56.7
514T>C	H83H	83	0	83	0	0	0	0	56.5
513A>G	H83R	4	0	0	3	1	0	0	56.5
506C>T	H81Y	7	0	3	3	0	1	0	51.0

Table S50: Frequencies of single SNP genotypes in the NIIDWH-1SeqR840

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
818T>C	Y5H	1	0	0	0	0	1	0	57.7
806G>A	A1T	1	0	0	0	1	0	0	51.5
817C>T	R4R	1	0	0	0	1	0	0	52.3
816G>A	R4H	2	0	1	0	0	0	1	51.3
813C>A	T3N	2	1	0	0	0	0	1	52.3
809T>A	Y2N	6	3	0	0	3	0	0	55.6
810A>G	Y2C	2	1	0	0	0	0	1	57.5
814T>C	T3T	1	0	0	0	0	0	1	57.2
813C>T	T3I	1	0	0	0	0	1	0	52.3
823C>T	V6V	36	1	4	13	2	1	15	53.3
809T>C	Y2H	3	0	1	1	1	0	0	57.5
815C>T	R4C	10	0	3	7	0	0	0	52.0

Table S51: Frequencies of single SNP genotypes in the WuhanCoV-spk1-f

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
24364T>G	I934M	1	0	1	0	0	0	0	60.0
24367A>C	Q935H	1	0	0	0	0	1	0	60.2
24376T>C	L938L	1	0	0	0	0	1	0	59.3
24367A>G	Q935Q	2	0	1	0	0	1	0	59.9
24373A>G	S937S	2	0	2	0	0	0	0	60.3
24376T>G	L938L	1	0	0	1	0	0	0	59.6
24374C>T	L938F	6	0	0	0	2	3	1	56.6
24372C>T	S937L	3	0	0	1	2	0	0	56.0
24370C>A	D936E	1	0	1	0	0	0	0	56.6
24370C>T	D936D	10	1	6	2	0	0	1	56.6
24358C>A	G932G	8	0	7	0	1	0	0	56.2
24374C>A	L938I	1	0	0	1	0	0	0	56.6
24368G>T	D936Y	393	264	3	4	118	2	2	55.9
24368G>C	D936H	3	0	1	2	0	0	0	58.5

Table S52: Frequencies of single SNP genotypes in the WuhanCoV-spk1-r

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
24896C>T	P1112S	2	0	0	0	0	2	0	55.1
24877A>G	T1105T	2	0	2	0	0	0	0	59.3
24887T>C	F1109L	3	0	0	2	0	0	1	58.3
24897C>T	P1112L	3	0	0	1	1	0	1	54.5

Table S53: Frequencies of single SNP genotypes in the NIIDWH-1F24381

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
24380T>A	S940T	1	0	0	1	0	0	0	56.6
24383A>G	T941A	1	0	0	1	0	0	0	60.0
24364T>G	I934M	1	0	1	0	0	0	0	58.7
24367A>C	Q935H	1	0	0	0	0	1	0	59.9
24376T>C	L938L	1	0	0	0	0	1	0	58.8
24367A>G	Q935Q	2	0	1	0	0	1	0	59.5
24382C>G	S940S	1	0	1	0	0	0	0	57.5
24378C>A	S939Y	1	0	0	1	0	0	0	54.8
24373A>G	S937S	2	0	2	0	0	0	0	60.0
24376T>G	L938L	1	0	0	1	0	0	0	59.2
24374C>T	L938F	6	0	0	0	2	3	1	55.6
24372C>T	S937L	3	0	0	1	2	0	0	54.9
24370C>A	D936E	1	0	1	0	0	0	0	55.6
24381C>T	S940F	10	0	5	0	2	2	1	55.4
24370C>T	D936D	10	1	6	2	0	0	1	55.6
24378C>T	S939F	24	6	5	2	7	3	1	56.1
24374C>A	L938I	1	0	0	1	0	0	0	55.6
24368G>T	D936Y	393	264	3	4	118	2	2	54.8
24368G>C	D936H	3	0	1	2	0	0	0	57.8
24382C>T	S940S	31	4	4	0	22	0	1	54.2

Table S54: Frequencies of single SNP genotypes in the NIIDWH-1R24873

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
24842G>A	V1094I	3	0	3	0	0	0	0	54.1
24834G>A	R1091H	2	0	0	2	0	0	0	55.6
24834G>T	R1091L	4	1	1	0	2	0	0	56.2
24856T>C	N1098N	1	0	0	0	1	0	0	58.1
24844C>T	V1094V	5	0	0	1	4	0	0	55.8

Table S55: Frequencies of single SNP genotypes in the NIIDWH-1SeqF24383

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
24380T>A	S940T	1	0	0	1	0	0	0	56.2
24383A>G	T941A	1	0	0	1	0	0	0	59.6
24367A>C	Q935H	1	0	0	0	0	1	0	59.5
24376T>C	L938L	1	0	0	0	0	1	0	58.4
24367A>G	Q935Q	2	0	1	0	0	1	0	59.1
24382C>G	S940S	1	0	1	0	0	0	0	57.1
24378C>A	S939Y	1	0	0	1	0	0	0	54.4
24373A>G	S937S	2	0	2	0	0	0	0	59.6
24376T>G	L938L	1	0	0	1	0	0	0	58.8
24374C>T	L938F	6	0	0	0	2	3	1	55.2
24386G>T	A942S	7	0	1	6	0	0	0	56.0
24372C>T	S937L	3	0	0	1	2	0	0	54.5
24370C>A	D936E	1	0	1	0	0	0	0	55.2
24381C>T	S940F	10	0	5	0	2	2	1	55.0
24370C>T	D936D	10	1	6	2	0	0	1	55.2
24378C>T	S939F	24	6	5	2	7	3	1	55.8
24374C>A	L938I	1	0	0	1	0	0	0	55.2
24385A>G	T941T	3	0	0	0	0	0	3	59.8
24368G>T	D936Y	393	264	3	4	118	2	2	54.4
24368G>C	D936H	3	0	1	2	0	0	0	57.5
24382C>T	S940S	31	4	4	0	22	0	1	53.8

Table S56: Frequencies of single SNP genotypes in the NIIDWH-1SeqR24865

SNP position	Protein mutation	Total frequency	ClusterI	ClusterII	ClusterIII	ClusterIV	ClusterV	ClusterVI	Tm(°C)
24832T>C	P1090P	1	1	0	0	0	0	0	59.1
24842G>A	V1094I	3	0	3	0	0	0	0	52.6
24834G>A	R1091H	2	0	0	2	0	0	0	53.1
24833C>T	R1091C	2	0	0	2	0	0	0	53.7
24834G>T	R1091L	4	1	1	0	2	0	0	53.2
24844C>T	V1094V	5	0	0	1	4	0	0	54.6

## S2 Additional supporting material

Total 7 spreadsheets are merged in the Supporting\_Tables.xlsx.

S57: Acknowledgement table provided by GISAID in Jan 2020.

S58: Acknowledgement table provided by GISAID in Feb 2020.

- S69: Acknowledgement table provided by GISAID in March 2020.
- S60: Acknowledgement table provided by GISAID in April 2020.
- S61: Acknowledgement table provided by GISAID in May 2020.
- S62: Acknowledgement table provided by GISAID in June 2020.
- S63: Acknowledgement table provided by GISAID in July 2020.

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